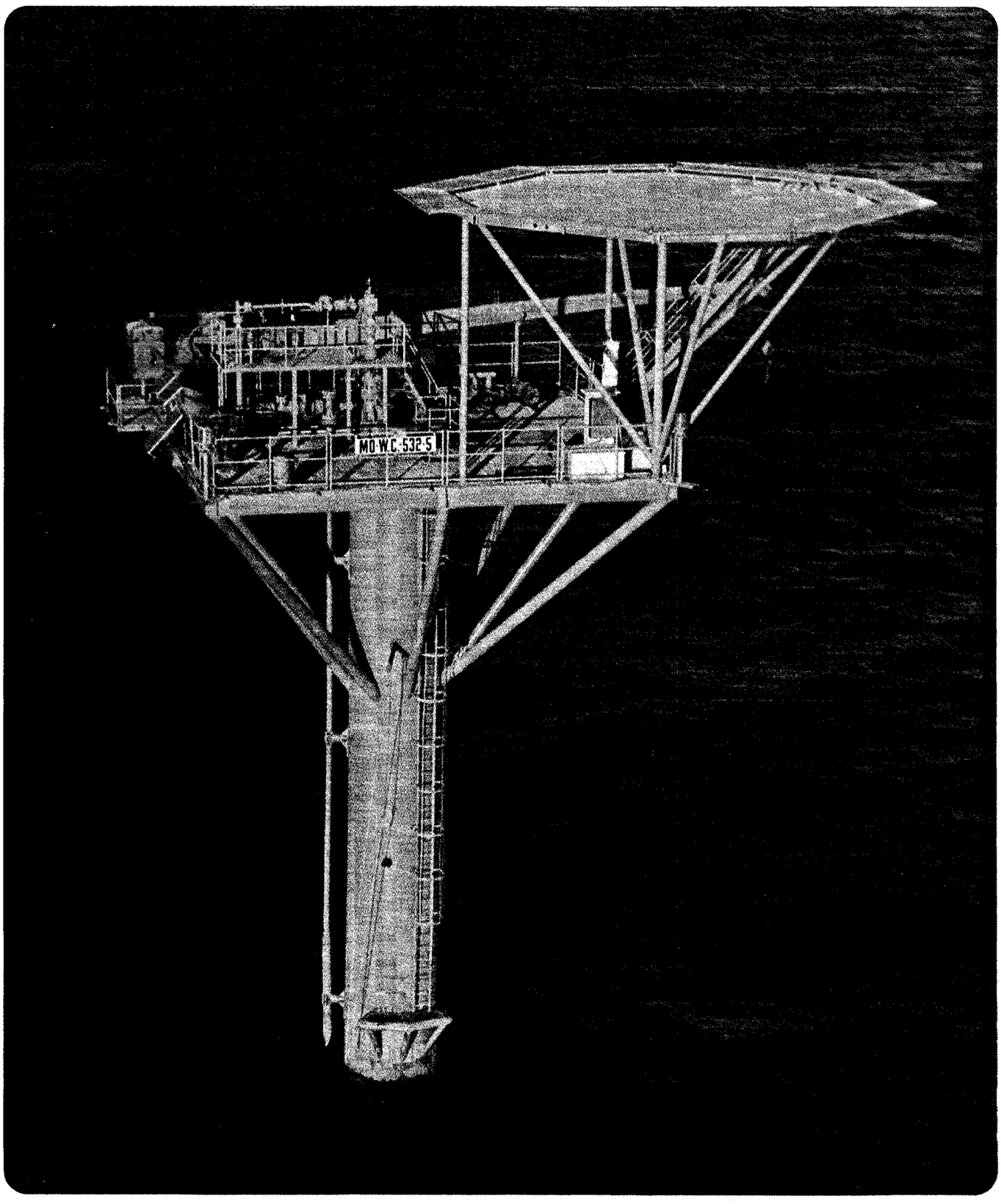
Atkins Insight

Number 58 Spring 1983



Atkins Insight

The house journal of the WS Atkins Group

Number 58 *Spring 1983*

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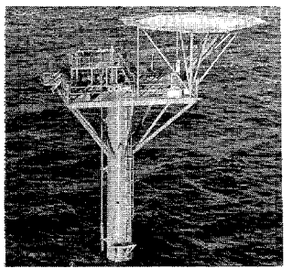

FRONT COVER

Photograph by Simon Learoyd.

A single-well caisson standing in a depth of 53m some 160km south of the Texas/Louisiana border in the Gulf of Mexico. On behalf of Mobil Research and Development, Atkins' Houston office has been monitoring the structural response of this remote single tapered pile and analysing the data using the maximum entropy method. See article on page 5.

The WS Atkins Group provides professional consultancy services to industry, commerce, government departments and agencies, municipal authorities and other organisations throughout the world, and is recognised as one of the largest independent, integrated consultancies in Europe. Other services range from quality control to printing.

WS Atkins Group Consultants co-ordinates the activities of the consulting organisations within the WS Atkins Group.

Atkins Planning is a planning and management consultancy, carrying out financial and economic feasibility studies in a wide range of technologies at both strategic and tactical levels. It also provides the full range of management consultancy concentrating on the requirements of new and expanding organisations. The expertise available includes process planning, market planning and research, economics, finance and accounting, transport planning, regional planning, organisation development, systems design and operational research, manpower resourcing and training.

WS Atkins & Partners is a consulting engineering practice undertaking feasibility studies, project planning, detailed engineering design and management of construction for capital projects. Specialists are employed in a wide range of activities comprising civil, structural, transportation, mechanical, electrical and environmental engineering; systems engineering; metallurgical, petrochemical and process engineering; and project management services. Henry Pooley Atkins offers a comprehensive consulting service to the cement and allied industries.

Atkins Sheppard Fidler and Associates is an architectural, urban planning and landscape architectural practice with a wide range of experience on projects of varying types, sizes and complexity. These include hospitals, educational establishments, new towns, shopping centres, housing developments, office buildings, factories and industrial plant, major planning inquiries, motorway route location studies, motorway service areas, regional parks, environmental improvement schemes and conservation area studies.

Atkins Research and Development is an environmental and advanced technology consultancy with particular expertise in problems concerning noise and vibration, dynamics, social response, ecology, environmental impact, advanced stress analysis and engineering development.

Atkins Land & Water Management provides a comprehensive range of consultancy services in agricultural and integrated rural development, agro-industry and fisheries projects.

WS Atkins International acts as the parent organisation co-ordinating certain Atkins companies and branch offices overseas.

Atkins Inspection Services Limited and **Atkins Laboratories Limited** provide a comprehensive range of quality control services including inspection of construction on site and in suppliers' works, and pipeline inspection offshore and onshore. They carry out non-destructive testing and material identification, and their laboratory is Lloyd's-approved for radiography.

Kins Applied Technology Limited designs and implements total computer systems. In addition to its own resources it can draw upon Group expertise to achieve solutions to industrial and business automation problems.

Kins Developments Limited supplies packaged engineering software, together with associated training and support services.

Kins Plants Limited is dedicated to the development and exploitation of new crops for food and industry.

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Water study for Qatif

THE WATER and Sewage Directorate of the Ministry of Municipal and Rural Affairs, Eastern Province of Saudi Arabia, has appointed the joint venture of Saudi Consulting House and WS Atkins to undertake preliminary studies of water supply, sewerage and storm water drainage for the Qatif region. The project area is on the Arabian Gulf north of Dammam and covers approximately 200km² including the town of Qatif and 24 smaller towns and villages.

Work includes a review of existing facilities, analysis of water demand of present and future population, and the preparation of preliminary engineering designs to cater for an anticipated population increase to the year 2010.

Bulk water supplies from a multi-flash distillation plant are provided at three points in the project area, where they are blended with groundwater obtained from wells up to 165m deep. The blended water is pumped to overhead reservoirs, from where it gravitates into the distribution system.

Corrosive soil conditions and a very high water table prevail in the area, so that considerable care has to be taken with the choice and protection of pipe materials.

Work on the study has begun and is expected to last eight months. Atkins' project director is Chris Binnie, with Chris Cutler as project manager.

EVIDENCE FOR ENERGY COMMITTEE

THE HOUSE of Commons Select Committee on Energy heard evidence at Westminster from five members of Atkins' staff during the final session of its inquiry into combined heat and power.

Ted Anthony, who directed Atkins' role as lead consultant to the Department of Energy on Stage 1 of the Combined Heat and Power and District Heating feasibility programme, informed the committee that there was a *prima facie* case for supposing that private finance could be attracted for large CHP schemes. "We have received numerous enquiries from finance houses and commercial entrepreneurs since the CHP/DH report was published." he said.

The study showed that such schemes in several major UK cities would meet the Government's required rate of return on investment. "A five per cent return over 35 years is attractive compared to some other alternatives," stated Mr Anthony.

The Atkins team attending the session comprised John Faulkner of WS Atkins Group Consultants, Ted Anthony and Bill Rowe of WS Atkins & Partners, Martin Cadman of Atkins Planning, and Tim Murphy of Atkins Research and Development.

The energy committee was instigated in 1979 and is due to deliver its findings early this year. The fact that Atkins was invited to attend within months of publishing its report and recommendations, and at the end of the committee's period for hearing evidence, highlights the level of interest currently being shown in CHP/DII in parliamentary circles.

Atkins and CADCentre

A CONSORTIUM led by computer-manufacturer ICL, and including the WS Atkins Group, and computer services company SIA, is to purchase the share capital of the Government's Cambridge-based Computer Aided Design Centre for £1 million.

This follows an agreement in principle reached between the consortium and the Department of Industry on 30 March. As part of this agreement, the consortium will continue actively to develop CAD/CAM techniques in the UK and maintain employment at the centre for the foreseeable future.

The Department of Industry has agreed to provide financial support to help the transition of the CADCentre from a Government research establishment to a commercially-run company. In return, the Government will be entitled to a royalty based on the centre's turnover.

ACCREDITATION FOR ATLABS

NATLAS
NATIONAL TESTING
LABORATORY
ACCREDITATION
SCHEME

NATLAS REG. NO. 0247

THE UK Government has recently set up the National Testing Laboratory Accreditation Scheme – NATLAS for short – for accrediting testing laboratories to ensure that the results they provide for British industry are accepted as authoritative both in the United Kingdom and overseas. During assessment, laboratories must satisfy certain requirements concerning staff, equipment, general facilities and management before being granted certificates of competence to carry out defined types of tests.

Atkins Laboratories Limited is now listed in the NATLAS directory of testing laboratories under registration number 0247. The company's approval under the scheme is based on the recognition of its compliance with the requirements of Lloyd's Register of Approved Radiographic Establishments and covers X-radiography of ferrous weldments.

MERSEYSIDE DOCKLAND DEVELOPMENT PROJECT

THE INTERNATIONAL Garden Festival, to be held in Liverpool in 1984, is one of the first major projects undertaken by the Merseyside Development Corporation. The scheme will regenerate part of Merseyside's derelict and under-used dockland area by improving the environment and attracting new industrial, commercial, leisure and housing developments.

WS Atkins & Partners' Project Management Services Division has prepared and will continuously monitor the master programme for design and construction, including co-ordinating the work of six independent design teams to ensure that working drawings are supplied to the management contractors on schedule. A particular difficulty is that there is only half the design and construction period usually available for projects of this kind.

The project covers over 100 hectares of the riverside area, previously accessible only to waste disposal traffic and adventurous pedestrians. It comprises a disused part-cleared tank farm, a local authority tip, a disused underground petroleum store and some neglected woodland and playing fields. However, it has a long unobstructed river frontage with extensive views to the south-west across the River Mersey and to Wales.

In addition to achieving the reclamation of the area and providing sites for housing and science-based industry, this unique festival will leave lasting facilities for the people of Liverpool, such as the Festival Hall, esplanade, sports arena and pub/restaurant – all within an attractive parkland setting.

Atkins' programme manager is David Denson, with Rob Clark as assistant manager.

Ain Zada Dam contract awarded

A CONTRACT for the detailed design and technical assistance for the Ain Zada Dam on the Oued Bou Sellam, in Algeria, has been awarded to a consortium of WS Atkins International and Howard Humphreys Limited. The client is the General Directorate of Hydraulic Infrastructure.

This project is a rockfill dam 55m high with a clay core, impounding a reservoir of about 130 million m³. The structures include a draw-off tower and outlet conduit, and an open-chute uncontrolled spillway of 4400m³/s capacity. Earthquake analyses are an important feature of the design.

Work on the project started at the end of 1982 and will continue for a period of four and a half years. Atkins' project director is Chris Binnie and David Nichols is project manager for Atkins.

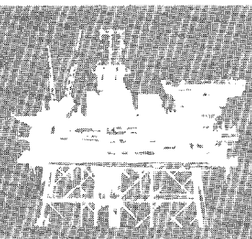
Grants for flexible manufacturing

THE DEPARTMENT of Industry has announced its intention to encourage the development of flexible manufacturing systems within UK industry by giving financial aid both for consultancy work and the resulting capital expenditure.

The grants are only being made available for the employment of qualified consultants and Atkins Planning is approved by the Department to undertake this kind of work. Up to 50 per cent of the consultancy fees will be funded by the Department of Industry, subject to a maximum grant of £50 000, and a subsequent grant of 30 per cent of the capital expenditure made available.

The aim of flexible manufacturing systems is to integrate the latest techniques in production technology, production control, materials handling and information systems to bring previously unachievable economies into batch manufacturing. Microprocessors, computer technology and automation are central to this theme, and to qualify a scheme must be innovative, extending the scope of the techniques employed.

With the combined resources of its computer and operational consultancy, Atkins Planning is well placed to undertake this kind of study, and Group experience in engineering, automation and microprocessor applications reinforces this capability.



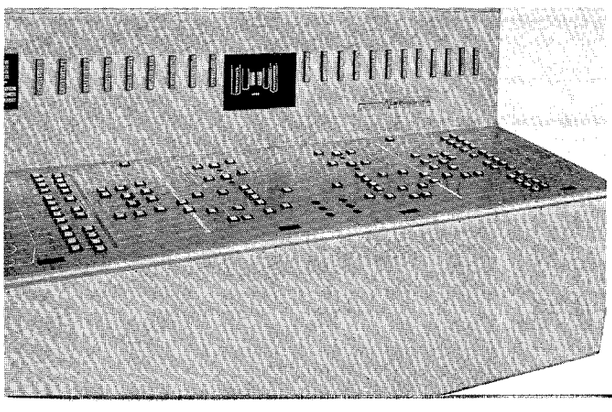
THE OFFSHORE SCENE

Simulator to train drilling crews

PLANS are being made to set up a training school at Houston, Texas, to teach ballast control, stability and buoyancy techniques. The school is aimed at offshore personnel within drilling contractors whose duties include the control or movement of ballast, or whose work involves significant changes in the mass distribution of a vessel which would need a ballast water movement in order to maintain heel and trim.

The school will be based around a simulator – currently being developed by Atkins as an extension of its On-board Monitoring and Simulation system (OMS) – which will model the characteristics of drilling vessels both in terms of hull stability and the pumping/pipework/ ballast tank controls and flow network. In operation, a trainee will stand at a console, similar to the ballast tank control of a vessel, with controls for pumps and valves, and indicators showing ballast tank levels. Movement of ballast tank water is simulated when controls are adjusted by the trainee, who will see tank contents changing as would happen in a live situation.

To add further realism, the simulator will be mounted on a large tilt table which is heeled and trimmed in line with a drilling vessel's movements offshore. The simulator will take account of the effect of free surfaces in the tanks, and simulate the loads imposed by wind, waves, currents and mooring lines – all of which will be selected by the training instructor and fed in via a remote terminal. The supervisor can also simulate malfunctions of pipes, valves or indicators which will require the trainee to diagnose the fault and overcome the problem promptly. In addition, vessel damage and the flooding of normally dry compartments can be created.

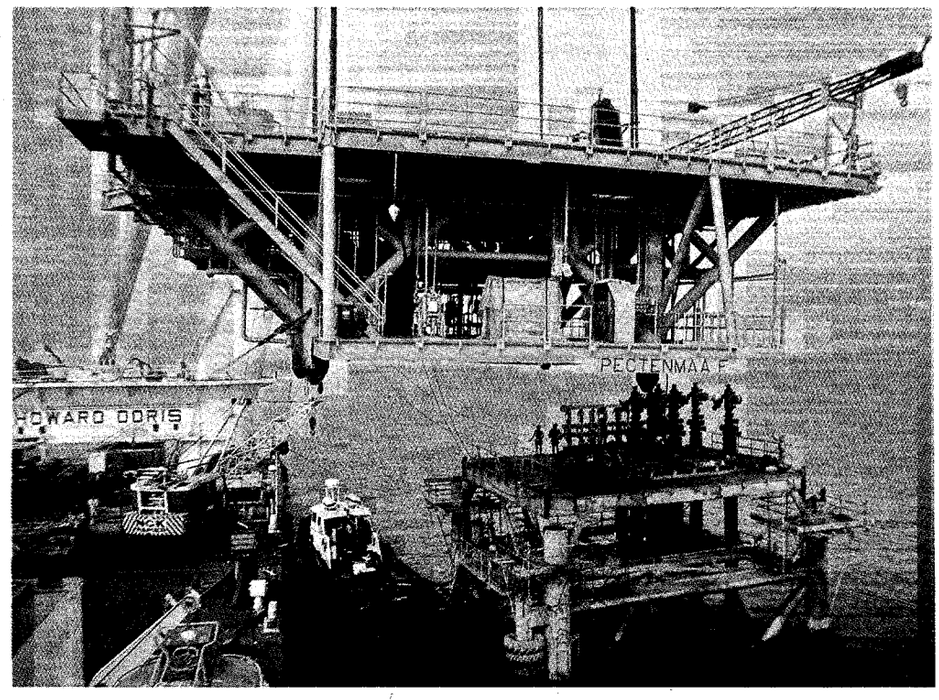


The heart of the Atkins simulator is a DEC PDP 11/23 microcomputer which will interface with the hundreds of input and output analogue displays and controls, including the control mechanisms to tilt the simulator floor. The training supervisor's remote console will be provided with override switches to simulate control system malfunctions and cause compartments to flood. The supervisor will also be able to feed instructions to the simulator via a computer keyboard.

The console of the training simulator for ballast control – an extension of Atkins' On-board Monitoring and Simulation (OMS) system.

Atkins is currently talking with the US Coastguard and other regulatory authorities about approval for the proposed training courses, and anticipates selling simulators direct to drilling contractors, with each one customised to simulate particular vessels. A single unit could be used to model several vessels by changing the main console panel and the vessel data base.

Bill Stewart, head of Atkins' Houston operation, sees a great need for the simulators. "These could be set up in all areas of the world where there is significant offshore drilling activity – such as Mexico, Indonesia, Brazil, Canada, Australia, not forgetting the UK and Scandinavia," he says.



OMS SYSTEM AIDS OFFSHORE LIFT

This photograph shows Howard Doris Marine Services' heavy duty floating derrick Tog Mor *operating in the Mokoko Abanna Field, 50km off the coast of Cameroon, West Africa, in late January 1983 after being fitted with an On-board Monitoring and Simulation (OMS) system supplied by AF Marine to enable it to undertake delicate weather-sensitive tasks with great efficiency.*

Developed by Atkins Research and Development, the OMS system supplies the captains and lifting superintendents of pipelaying, drilling and offshore lifting vessels with semi-animated logical displays, in colour, of vessel parameters, results of motion simulations and data from on-board motion sensors.

To undertake its offshore operation for the Mokoko Abanna Field, Tog Mor *first lifted on to its own deck the Pectenmaa F platform deck structure from an ocean-going barge in the shelter of Douala Harbour, transported it to the field, then lifted the deck structure and positioned it accurately on the Pectenmaa F jacket. Captain John Gray of Howard Doris says: 'The OMS system proved of great value both in preparing for the lifts and during the lifts.'*

The photograph was taken by George Mitchell of Atkins Research and Development, who was aboard Tog Mor *at the time. The purpose of his presence was twofold. First, he assessed the deck structure lift carried out in Douala Harbour and applied the experience gained on this to the planning of the offshore lift. Second, and of greater importance, George provided Howard Doris with a plan for the offshore lift which called for the minimum amount of ballast pumping subject to safety and other operational contraints. This was achieved and only 50 tonnes of ballast needed to be pumped during the lifting of the load from* Tog Mor *on to the jacket structure.*

CAISSON MONITORING IN THE GULF OF MEXICO

IN MID-1981, Mobil Research and Development Corporation of Dallas, Texas, appointed Atkins' Houston-based company to design a system for the acquisition of structural response data from a remote single-well caisson in the Gulf of Mexico.

This caisson is a simple steel structure and stands in 53m of water some 160km south of the Texas/Louisiana coast, in the West Cameron area. It is a single tapered pile, driven deep into the mud of the Gulf seabed, and supports a small deck and helipad 17m above the blue waters. Gas from a single well on this satellite structure is taken 8km by seabed pipeline to a manned production platform where it is processed before being piped to shore.

Due to the remote nature of the structure, and as it was foreseen that a long data acquisition period might be required in order to measure its response in the worst storm conditions possible, Atkins prepared a data acquisition system with a link directly back to its Houston office. This enabled the integrity of the instrumentation to be checked from Houston, and removed the need to visit the platform to collect data tapes prior to analysis. In addition, the data could be digitised offshore and received directly by the Houston-based computer.

The purpose of the project is to determine total damping associated with the dynamic response of the structure, and to discover whether this damping increases with increasing sea state – as predicted by analysis techniques.

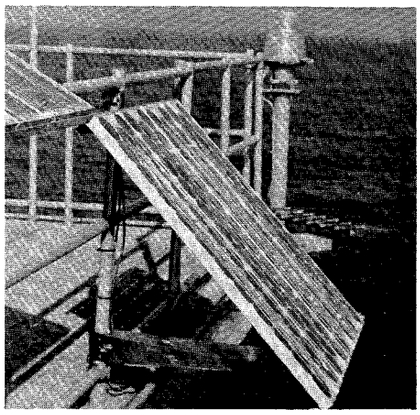
The instrumentation system

A spectral data analysis procedure called the maximum entropy method (MEM) developed at the Massachusetts Institute of Technology (MIT) was suggested by Mobil for the derivation of damping terms directly from response measurements. This request was readily agreed to as Atkins Research and Development had already used MEM in processing data from the Montrose platform in the North Sea.

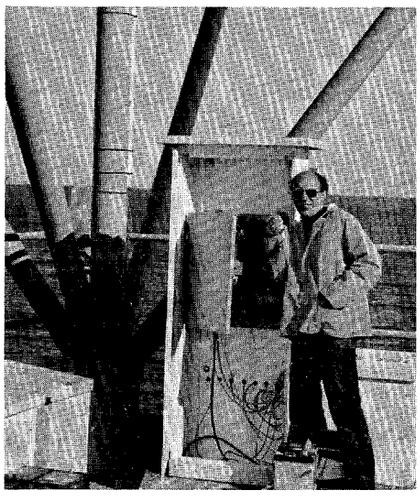
Following Mobil's acceptance of the bid submitted by Atkins, the instrumentation system was installed in March 1982. This includes an infra-red laser wave-height meter, eight accelerometers to measure the movement of the deck, and wind speed/direction measuring devices. All transducers are powered by batteries which are recharged by solar cells. A microcomputer system digitises the signals and can select different channels and digitisation rates on command from the computer at Atkins' Houston office.

The data link to the caisson is a full duplex 1200 baud link via VHF radio for the first 8km to the nearby manned platform. From this platform to a shore station at Lake Charles, Louisiana, the link comprises a line-of-sight microwave network. Between Lake Charles and Atkins' Houston office, the link runs through a dedicated four-wire telephone line provided by Southwestern Bell.

All equipment and data links were operating satisfactorily by May 1982 but, as there had been no significant storms by July 1982, Mobil requested that the data gathering period be extended and also suggested that Atkins should determine whether other companies would be interested in joining the project. By October sufficient interest had been expressed by other companies who were prepared to fund the project and the collection of data was extended throughout the winter period.



Solar panels are employed to recharge the batteries that power the transducers in the data acquisition system. (Photograph by Bill Stewart)



Simon Learoyd with the data acquisition equipment on the caisson. (Photograph by Jorge Delgado)

Support from within the offshore industry is now such that the scope of the project has been widened to include the measurement of the directional energy content in the waves by placing two further wave height meters on the caisson. This task was undertaken by Simon Learoyd and Jorge Delgado during their visit to the structure prior to Christmas 1982.

Since July last year several significant storms have occurred and much valuable data has been recorded. The most intense storm hit the caisson in mid-January when waves exceeding 10m in height were measured, using the directional capability.

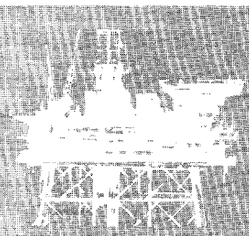
Encouraging participation

Participants in the extended project include Exxon, Shell, Mobil, BP, DNv, Elf, CNEXO, US Minerals Management Service, Liverpool University, London University and MIT. Further organisations are being encouraged to participate as this should provide the possibility of obtaining data in the hurricane season, and also allow for more-detailed data analysis.

Calibration work on an ASAS-generated finite element model of the caisson structure has shown the importance of modelling soil mass and stiffness, particularly on the fatigue life of the structure. The finite element model has also shown that soil stiffness – for small amplitude oscillations at the natural frequency – does not match that predicted by current design methods when using conventional American codes of practice. This, too, has a significant influence on the fatigue life of such structures.

Participation in the project by UK and US universities is being encouraged by Atkins' Houston-based staff, as it benefits industry by enabling the latest analytical techniques to be made available – albeit on an experimental basis at first – and helps the universities by giving them more exposure to industry as well as direct access to valuable full scale data.

Later this year the final report on the project will be presented to the participants. It will contain guidelines on the dynamic modelling of offshore structures with particular emphasis on hydrodynamic damping, its variation with sea state and its prediction using relative-velocity time-history calculations.



THE OFFSHORE SCENE

SEARCHING FOR MINERALS IN THE ARABIAN GULF

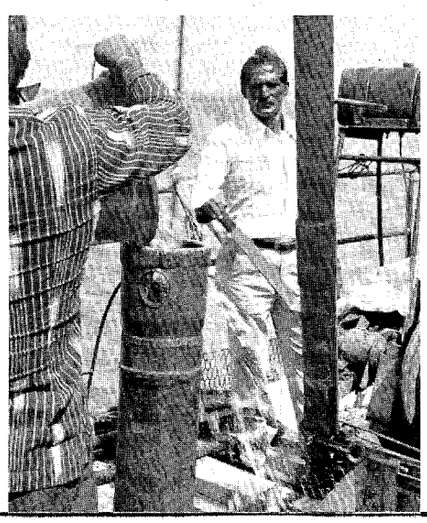
THROUGHOUT January and February 1983 an Atkins team has been supervising a drilling and proving campaign in a search for commercial quantities of calcium carbonate beneath the Arabian Gulf. This mineral is one of the major components required for the manufacture of Portland cement and occurs in a very pure form in sea shells. The operation was mounted to prove the volume and purity of the previously identified seashell deposits.

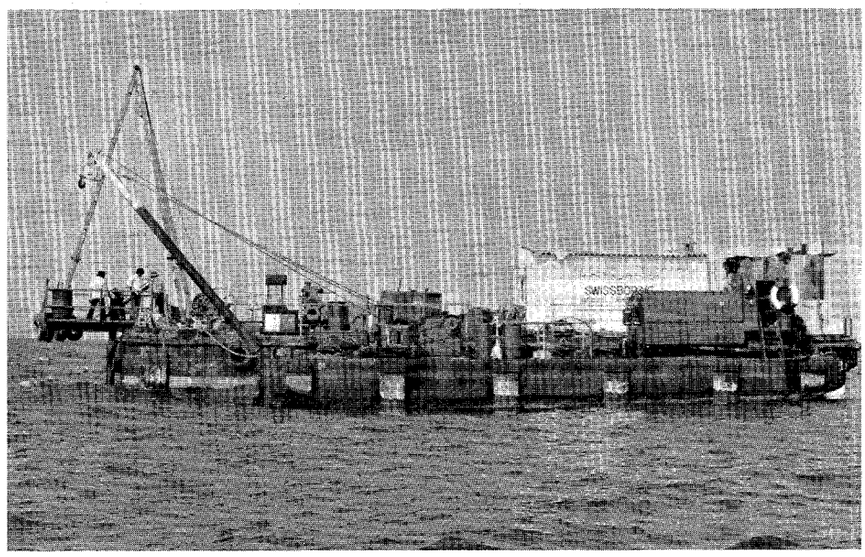
The reason behind the search stems from the aim of the Emirate of Umm al Qiwain to construct a one million tonne per annum cement plant in order to utilise some of its natural resources.

An onshore gas field is now being exploited in the neighbouring Emirate of Sharjah and gas from this field is to be supplied to the northern emirates of Umm al Qiwain and Ras al Khaimah. The gas will be used in Umm al Qiwain by a combined power station and seawater de-salination plant which is to be constructed adjacent to the proposed cement plant site. Power and water will be provided from this source to the cement plant. The gas will also be used to fire the cement kiln and to dry the raw materials.

A preliminary seabed prospecting search was made earlier this year by two divers – Malcolm Lanyon of Atkins' Dubai office and a locally hired expert. This work, which was supervised by geologist John Clutterbuck, revealed an area of shelly sands potentially useful for the manufacture of cement. Subsequent analysis showed these to have calcium carbonate contents of sufficient purity to be used in the manufacture of cement.

To prevent external materials reaching the borehole tube, the pressure in it is kept positive by topping up with seawater.





The Swissboring drilling rig F-25 on station in the Arabian Gulf.

Following this discovery a contract was let with the Dubai office of the Swissboring Overseas Corporation for a full offshore raw materials proving and drilling programme. This involved a drilling rig putting down a pattern of holes over a large area in order to establish the extent and depth of the deposit.

The drilling rig used was a Swissboring F-25 cable tool percussion drill using a bailer to obtain the raw materials. The bailer was raised and lowered inside a 200mm diameter steel casing which had previously been driven into the seabed. The drilling rig was mounted on a 24 by 12-metre barge which was moved and positioned by a tug boat. Drilling was carried out up to 2km offshore in a depth of 5m and the boreholes were taken down to 10m below seabed level.

John Clutterbuck – of the geological consultancy Temple Hazell Associates – has been logging the materials found in each hole and plotting the variations in deposits. This information was sent to WS Atkins Group headquarters at Epsom for processing using the computer-based MOSS three-dimensional modelling system, which will determine the quantities of the undersea mineral which can be economically exploited.

The intention is that the seashell deposits will be recovered from the seabed by using a barge-mounted cutter/suction dredger capable of pumping the materials to shore over a maximum distance of 3km. Once ashore, the raw materials will be dewatered and transferred to the cement plant for stocking out, blending and further processing.

Project manager for Atkins' work is Ron Hogg of Henry Pooley Atkins.

£1M inspection contract won by Atkins

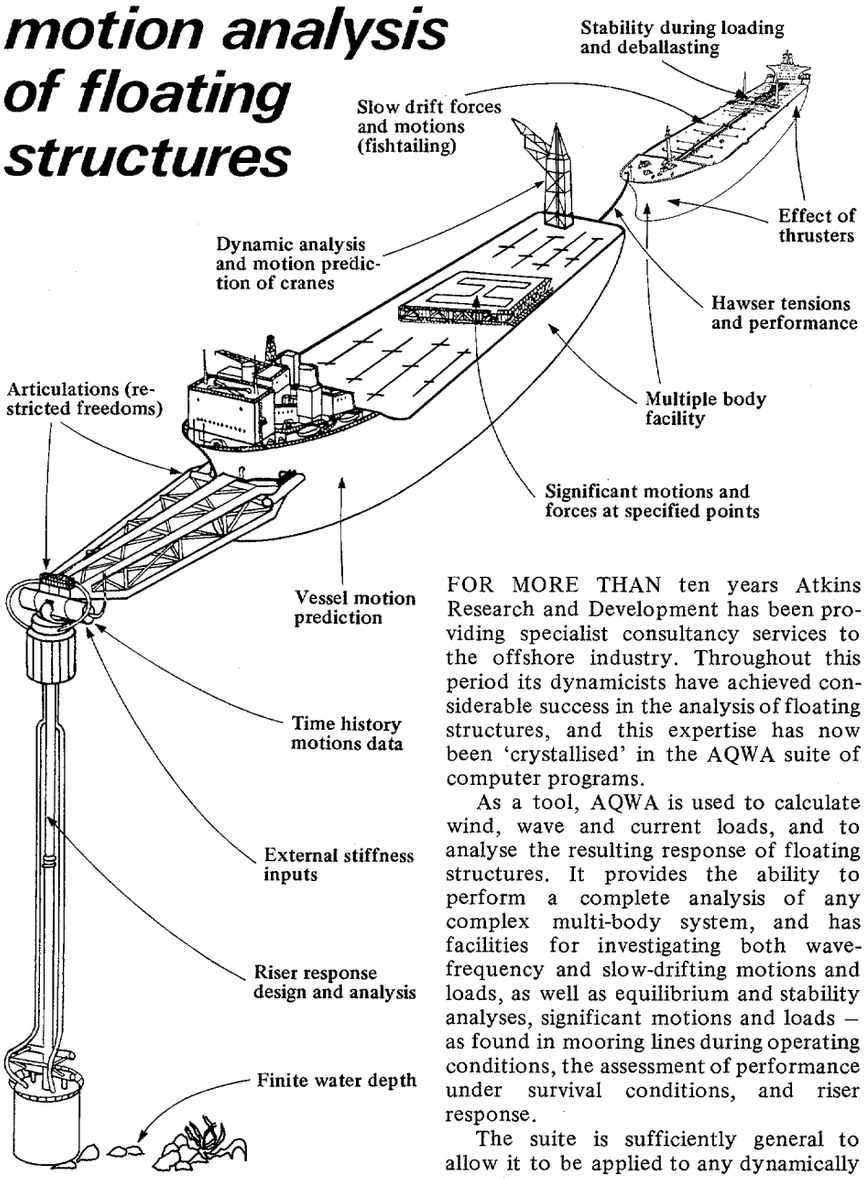
A CONTRACT worth over £1 million has been won by Atkins Inspection Services Limited, for inspection of offshore pipeline construction in the Norwegian sector of the North Sea.

Den Norske Stats Oljeselskap AS – as operator for the group of companies involved with this project – is to transport gas from the Statfjord Field in an offshore pipeline system to a processing plant in Norway. From this plant dry gas will be transported to a riser platform in North Sea Block 16/11, where it will be merged with gas from the Heimdal Field for transport to Ekofisk and West Germany.

Atkins Inspection Services is providing 36 fully qualified personnel to work offshore on two pipelay barges during the periods March to October 1983 and March to June 1984. The personnel will be formed into six crews with each crew comprising welding inspectors, radiographic film interpreters and ultrasonic inspectors. This allows each barge to have three inspection crews working for it: one on day shift, one on night shift and one on shore leave.

To service the contract, a project office has been set up at Stavanger, Norway, in conjunction with GMC Offshore AS. This Norwegian company is providing Atkins Inspection Services with all local facilities it requires.

AQWA – a suite for the motion analysis of floating structures



Some of the areas within floating structures in which the AQWA suite of computer programs can be applied.

FOR MORE THAN ten years Atkins Research and Development has been providing specialist consultancy services to the offshore industry. Throughout this period its dynamicists have achieved considerable success in the analysis of floating structures, and this expertise has now been 'crystallised' in the AQWA suite of computer programs.

As a tool, AQWA is used to calculate wind, wave and current loads, and to analyse the resulting response of floating structures. It provides the ability to perform a complete analysis of any complex multi-body system, and has facilities for investigating both wave-frequency and slow-drifting motions and loads, as well as equilibrium and stability analyses, significant motions and loads – as found in mooring lines during operating conditions, the assessment of performance under survival conditions, and riser response.

The suite is sufficiently general to allow it to be applied to any dynamically complex structure. Typical applications include the analysis of floating production systems and single-point tanker loading terminals using SALM, CALM or other mooring systems; complex deck-mating operations where several structures such as lifting vessel, hull and deck can all move independently; the station-keeping of vessels, whether they are passively or dynamically positioned; the stability of semi-submersibles, including damage stability; non-linear roll motions of transportation barges; anchor positions for floating structures; risers connected to fixed or floating platforms; the response of floating structures; and transient behaviour, such as the consequences of mooring line failures.

The architecture of the suite – which comprises six independent but dovetailed programs – has been carefully designed to work efficiently from a database description of the total system. Two of the component programs perform time-history simulations of a system's behaviour, while others are designed for performing parametric studies, providing insight and understanding of a system's dynamic characteristics, and cross-checking the time-domain simulations with frequency-domain simulations.

The AQWA suite features clear, neat data input with comprehensive data checking facilities, automatic meshing of body forms, and graphical display of both input and output data.

Although AQWA is intended mainly for use at the design stage, much of the simulation and prediction technology has been combined with proven instrumentation, monitoring, and data analysis techniques to form the On-board Monitoring and Simulation (OMS) system for aiding safety of offshore operations such as heavy lifts by crane barges (see the offshore lift story on page 4), and anchor positioning or ballast shifting of semi-submersibles.

INSPECTION WORK IN THE DUTCH SECTOR OF THE NORTH SEA

Atkins Inspection Services Limited was also heavily involved with offshore-related work last year. For NAM (Nederlandes Aardolie Maatschappij) the company provided a team of non-destructive testing specialists to carry out a major maintenance project on a number of offshore gas structures in the Dutch sector. The programme of work stretched throughout the full 1982 working season and employed 16 multi-discipline inspectors at its peak.

Another Netherlands-based contract involved the company with providing a team of surface-coating inspectors to COT, a major Dutch paint consultancy. The team carried a corrosion and maintenance survey of the protective coatings on a wide range of offshore structures.

In addition to maintenance work, Atkins Inspection Services was involved with two offshore pipeline projects. For Union Oil (Holland) it provided the quality control supervision on the McDermott laybarge LB28. The pipeline involved is about 30km long and the laying operation was carried out during an eight-week period in the spring and early summer of 1982.

The second pipelay project was somewhat smaller and required an inspection team on the barge which was working in the Leman E field, in British waters, for Shell UK Exploration and Production.

Assessing the safety of ventilation in industrial buildings

THE INCREASE in capital and running costs of forced ventilation systems in industrial buildings, plus other factors such as power supply limitations on offshore platforms, has highlighted the current need for greater efficiency in heating, ventilating and air conditioning (HVAC) systems. Examples have been found where energy savings of over 50 per cent could be made in cases where over-design has been employed to compensate for lack of accurate design procedures.

A trend in recent years has been to reduce the use of HVAC systems, and place greater reliance on natural ventilation. Whilst this is desirable from the point of view of energy conservation, it is important to use design methods that are accurate enough to ensure that the necessary quality and safety criteria are met. This is particularly so where critical air temperatures or gas concentrations are concerned as, for example, in the wellhead modules of offshore platforms, the storage of nuclear fuel, and in many types of industrial process.

There are four main methods which can be used in the design of HVAC systems for industrial buildings: design codes and practices; full-scale measurements; scale-model measurements; and computational modelling.

Design codes and practices

Existing design practices and guidelines employ a wide range of simple empirical formulae using bulk heat and mass exchange between rooms, assuming uniform conditions (BS5720, BS5925, and CIBS guides). In many cases these are sufficient but, in certain instances, more detail of the flow conditions and temperature distributions within rooms may be needed so that the desired quality and safety of ventilation is achieved. This can also lead to significant savings in installation and running costs.

Full-scale measurements

Full-scale measurements are potentially the most accurate means of obtaining data, but since specialised HVAC systems are generally one-off designs, these measurements can only be used for retrospective design changes. Despite the cost and difficulties involved in obtaining full-scale measurements under controlled conditions, data of this type can be invaluable to computational models for validation purposes.

Scale-model measurements

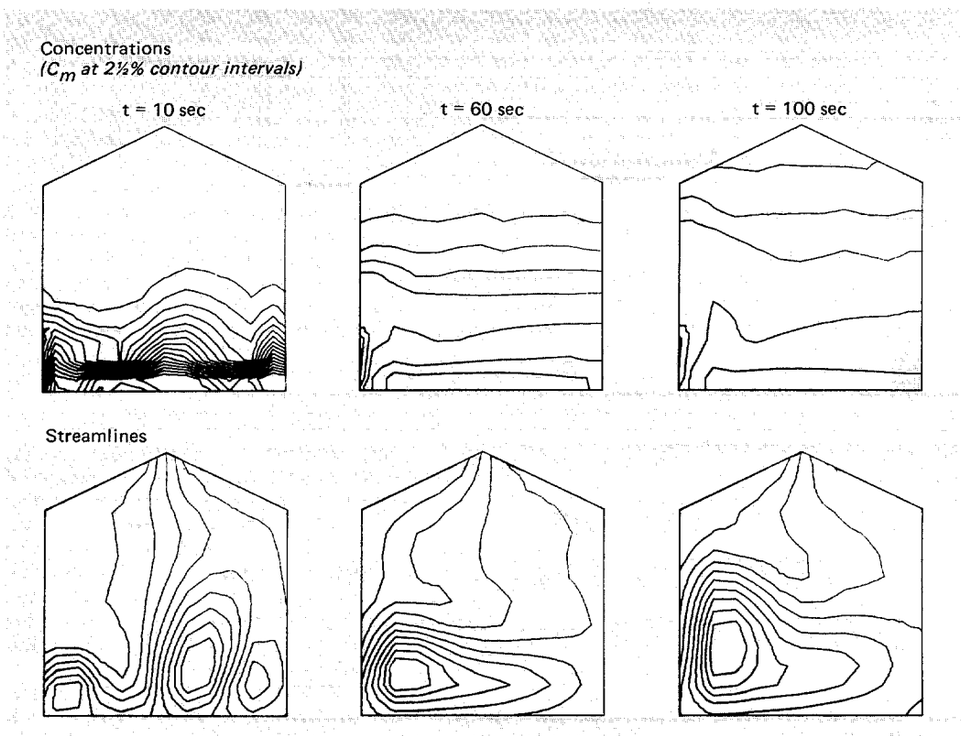
The use of scale models can alleviate some of the practical problems inherent in full-scale measurements. Wind tunnel tests are frequently used when it is suspected that an unusual surface pressure distribution exists on a building owing to the proximity of other structures or geographical features.

These tests can give useful predictions of bulk average quantities such as air changes per hour. However, it is very difficult to obtain accurate distributions of velocities and temperatures within the enclosed space, particularly with very low wind speeds where temperature-driven ventilation may dominate. This is because full dimensional similarity of Prandtl, Reynolds and Archimedes numbers is impossible to achieve in both model and prototype, as very high model-flow temperatures would be required – to the order of model-scale cubed.

Computational modelling

The use of computer programs is now widespread in all aspects of engineering design. Areas which can be handled by computer include the energy budget of buildings, HVAC network operation, and air infiltration and distribution, and considerable efforts are being made world-wide to develop new and more powerful programs. Model tests and full-scale measurements will play an important role in this work.

There are distinct advantages to be gained by using computational methods, such as flexibility and repeatability. Achieving a useful level of accuracy at an acceptable cost is of course an important consideration, especially where more sophisticated numerical methods are being employed – *ie* for calculating laminar and turbulent convective flows. However, considerable caution must be exercised in the use of advanced numerical techniques and turbulence models, and skilled engineering judgement will continue to play a very important role in the interpretation of results.

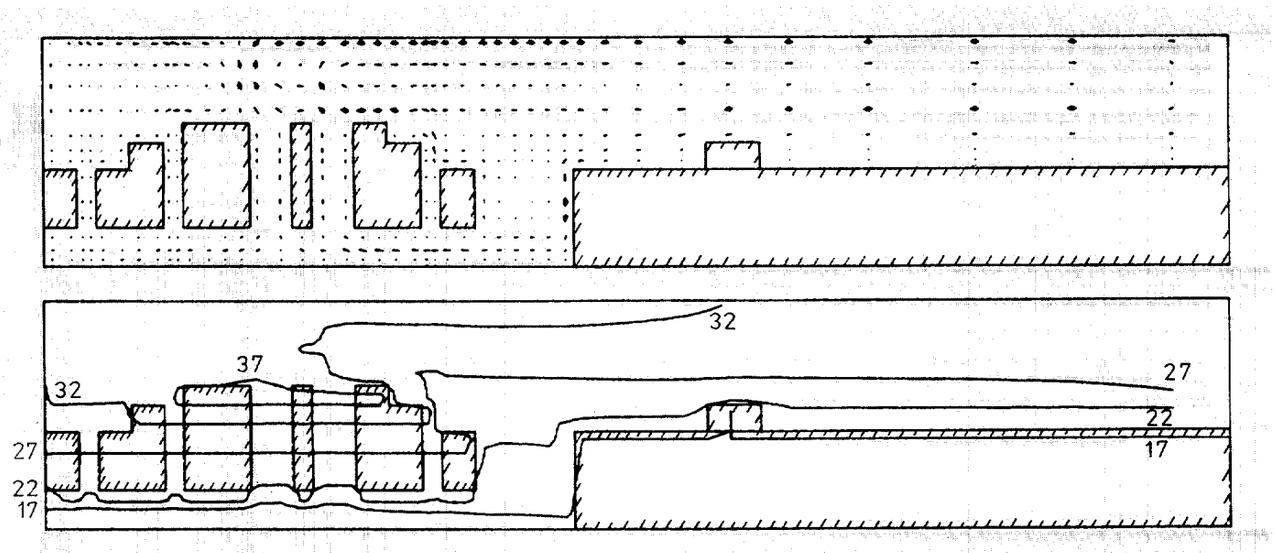


Mixing of chlorine in process building at chlor-alkali plant.

Ventilation studies by computational analysis using CAFE

Example: Discharge of chlorine from a fractured pipe in a chlor-alkali plant.

The main criterion in this example is safety. Hazard and risk analysis are very important in the design of nuclear and process plant. In this study an accident scenario was proposed in which a pipe containing a flow of chlorine gas at ambient temperature fractures in a chlorine process building.



Velocity vectors (top) and temperature contours in degrees C in turbine hall.

The building is closed on all sides except for a door in the east wall, and ventilation is provided by two extractor fans in the roof providing 12 air changes per hour. It is assumed that the maximum chlorine production rate of 8.9kg/minute will represent the maximum escape rate.

The information required is the time taken for concentrations of chlorine emerging from the extractor fans in the roof to reach a dangerous level. To determine this it is necessary to predict how the gas escaping from the pipe mixes with the air in the building. The Atkins program CAFE (*C*omputer-*A*ided *F*low *E*valuation) is used and the negative buoyancy effects caused by the dense chlorine are taken into account implicitly by the equations. CAFE is a turbulent-flow program which solves the partial differential equations for energy, momentum and continuity in two or three dimensions by the finite difference technique.

At time t = O, 130kg of chlorine is introduced in a 0.9m thick layer on the floor, with concentration C_m = 62.4 per cent. The flow patterns and concentration contours for the time-dependent flow within the building are produced diagrammatically for the time intervals shown. These show that the mixing is fairly rapid with the C_m = 2½ per cent contour almost reaching the outlet vent in 100 seconds.

Time histories of the concentration of gas at the roof vent, and of the percentage of the initial mass of chlorine remaining in the building, are shown graphically. The results suggest that the rate of flow of chlorine after 100 seconds is about 0.1kg/s, implying that the density of emerging gas is about 3 per cent higher than that of air. Because the density differences are small, a Gaussian plume model is used to represent the outside dispersion of chlorine away from the process building.

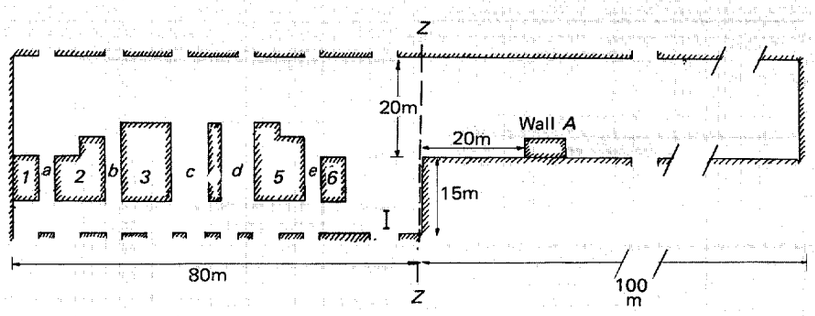
Example: Air quality within a power station turbine hall.

The main criterion here was the quality of the working environment within a nuclear power station's turbine hall measuring 180m by 50m by 35m high. Ventilation for the building is provided by inlet ducts along the lower boundary and outlet ducts along the top boundary, whereas the turbine machinery (blocks *1-6* in the diagram below) is the main heat source. The ductwork around this equipment is represented by the five vertical vents (*a-e*).

A wall had been introduced along *Z-Z* before the predictive work was carried out, from which boundary and calibration data could be obtained. The object of the work was to determine whether the alteration of the building configuration was likely to create high air velocities causing uncomfortable working conditions in the hall.

Such a case as this can be conveniently modelled using a computational approach, but great care must be taken to ensure that the results obtained are realistic. By using a two-dimensional format, the turbine hall was modelled as though its characteristics were independent of one of the horizontal co-ordinates, and vents were used to simulate flow around the turbines in between the ductwork and other obstructions.

The CAFE program was then applied to the full building interior, and results indicated that air velocities within the long extension would be uncomfortably high. A partition wall *A* was then introduced in the mathematical model which reduced the velocities at working levels to under 0.3m/s at a temperature of about 20°C. This wall is now under construction within the turbine hall and it is hoped that some full-scale measurements will be taken, when it is completed, that will verify the predictions.



Computer model of turbine hall.

This article is taken from a paper entitled The use of a computational method to assess the safety and quality of ventilation in industrial buildings *by Tim Broyd, Bruce Dean, Alan Moult and Steve Oldfield (all of Atkins Research and Development), to be presented at the 'International conference on heat and fluid flow in nuclear and process plant safety' — Institution of Mechanical Engineers, London, on 17-18 May 1983.*

REDUCING THE COST OF REFRIGERATION

Ray Gluckman of WS Atkins & Partners' Energy & Thermodynamics Department looks at the problems which face every industrial and commercial user of refrigeration plant, and suggests ways in which plant managers and in-plant maintenance engineeers can save on their companies' energy bills.

TOO FEW USERS of industrial and commercial refrigeration plant know how to save significantly on their energy costs. For many reasons – not least the attitude of some refrigeration contractors – the question of energy saving in this field has been largely ignored.

The Energy & Thermodynamics Department has been analysing the performance of industrial refrigeration for the past ten years. Out of the large number of plants examined, 95 per cent were identified as having 'considerable' energy wastage. In most cases Atkins was able to make energy savings of about 20 per cent for its clients; and on several occasions it was possible to increase this figure to 50 per cent.

What was the cost of making such savings? Often, little or no expenditure was required, as the faults were the plant manufacturers' responsibility. Elsewhere, simple maintenance was all that was required.

What needs to be done?

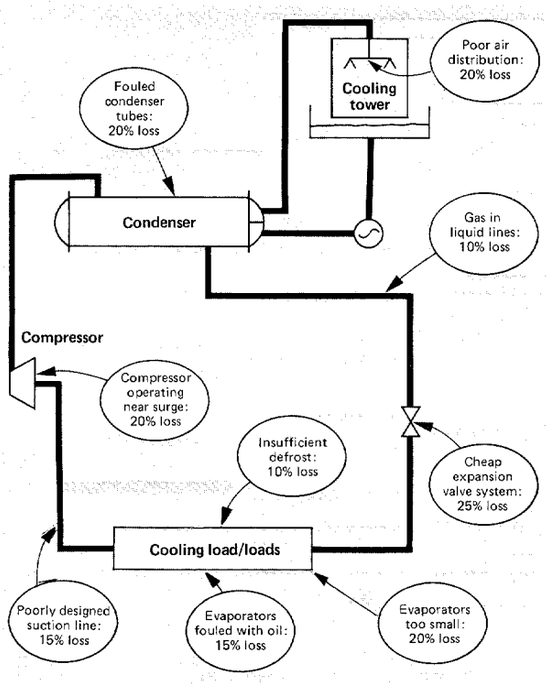
Most of the action is in the hands of the plant users, who should:

- Become aware of the problem. This is the most important step to take, as once the potential scope for savings is understood, the next steps become obvious.
- Assess what the cooling is being used for. In many cases refrigeration is being used where it is not really needed, or at temperatures lower than are necessary.
- Analyse the performance and efficiency of existing plant – this will show up all forms of energy wastage including design faults, and operational or maintenance problems. Such analyses should be repeated periodically.
- Take energy consumption into account when buying new plant. The careful selection of a compressor, for example, can improve running costs by as much as 25 per cent. Energy savings are always easiest to achieve at the design stage.
- After a new plant has been installed, have the performance assessed *independently*. It is amazing how many faults fail to be discovered during commissioning.

By far the best way to highlight the problems which exist is by stating actual examples. The cases outlined below – from which the names of the client companies and the manufacturers of the plant have been deliberately excluded – are all true, and have been undertaken by Atkins engineers in the last two years.

Case 1: What is cooling being used for?

When assessing a plant it is essential to estimate where the refrigeration capacity is being used, as sometimes the answers can be surprising. A recent study of a cold store showed that the 'genuine' cooling requirement (*ie* to account for losses through the building fabric) was only 28 per cent of the total. The remainder of the cooling was required to cope with the heat created by the fan motor to circulate the air, the internal lighting, and warm air which entered the store when its door was opened. Each of these could be substantially reduced, thus lowering the overall cooling requirements.



Some possible loss areas in a typical refrigeration plant. The figures quoted are average values.

Case 2: Proper plant commissioning

For several years a client in the brewing industry had been having problems keeping beer-conditioning rooms cold enough in summer. Atkins' plant analysis showed very low air flow over the cooling coils, and a subsequent investigation showed that the fans had been installed upside down. After modification, the cooling rate of the coils increased by 70 per cent, saving energy and, more importantly, improving product quality. This fault should have been recognised during commissioning tests, but these are rarely carried out to a sufficient level.

Case 3: Oil fouling in ammonia systems

One of the commonest causes of energy loss in ammonia refrigeration plants is oil-fouling of the evaporators. The presence of this oil lowers the evaporating temperature of a refrigeration plant, thus increasing the energy consumption and reducing the cooling capacity. The energy loss can be as much as 30 per cent. Probably the reason for this fault going unnoticed is that some operators assume that a compressor uses oil in the same way as a car engine: by burning it. This is not so, and the circuit must be oil-purged every few months, a quick and easy operation.

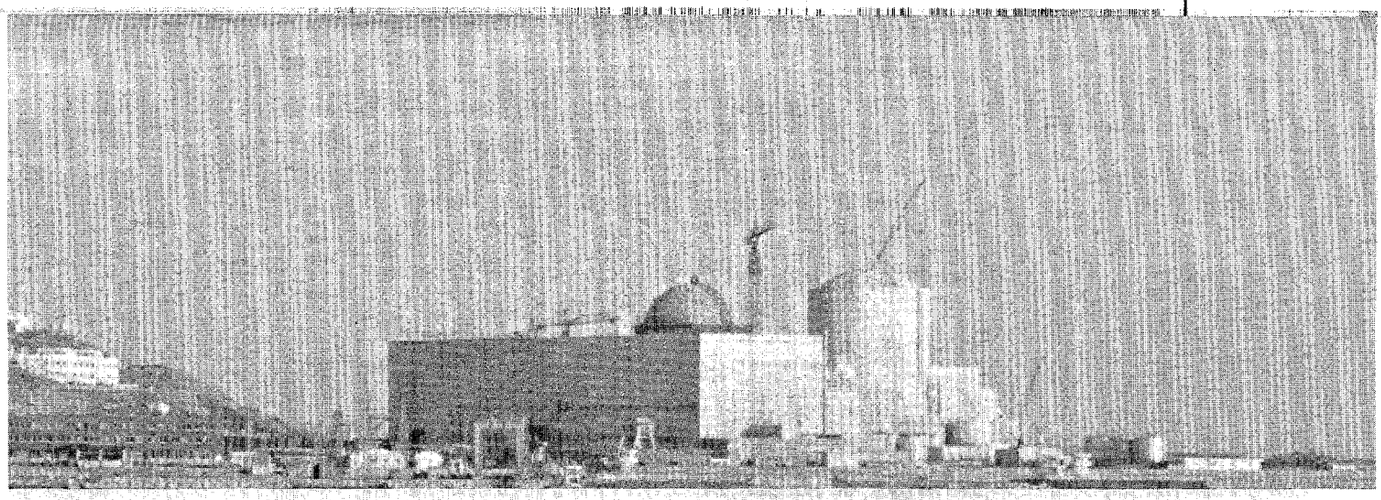
Case 4: Careful choice of new plant

The efficiency of apparently similar refrigeration compressors can vary considerably. When comparing the performance of two tenders for a new plant recently, Atkins discovered compressor efficiencies of 52 and 78 per cent. The careful selection of new plant does not cost anything – and in this case the more efficient unit was 30 per cent cheaper than the other.

Case 5: Control system design

It is not unusual to find perfectly good plant operating inefficiently due to a poor control system. In one particular air conditioning system, within a large hospital complex, Atkins engineers discovered 12 chillers of 1MW capacity, each operating at about 25 per cent of full load. The efficiency of a compressor running at only 25 per cent load is far below its value at 100 per cent load. The control system should have shut-down nine machines and run the remaining three at their most efficient level.

Case studies like these are plentiful. Less than one in ten of the refrigeration plants we look at are faultless. There is energy to be saved, and also major spin-offs to be gained, such as increased reliability and improved product quality.

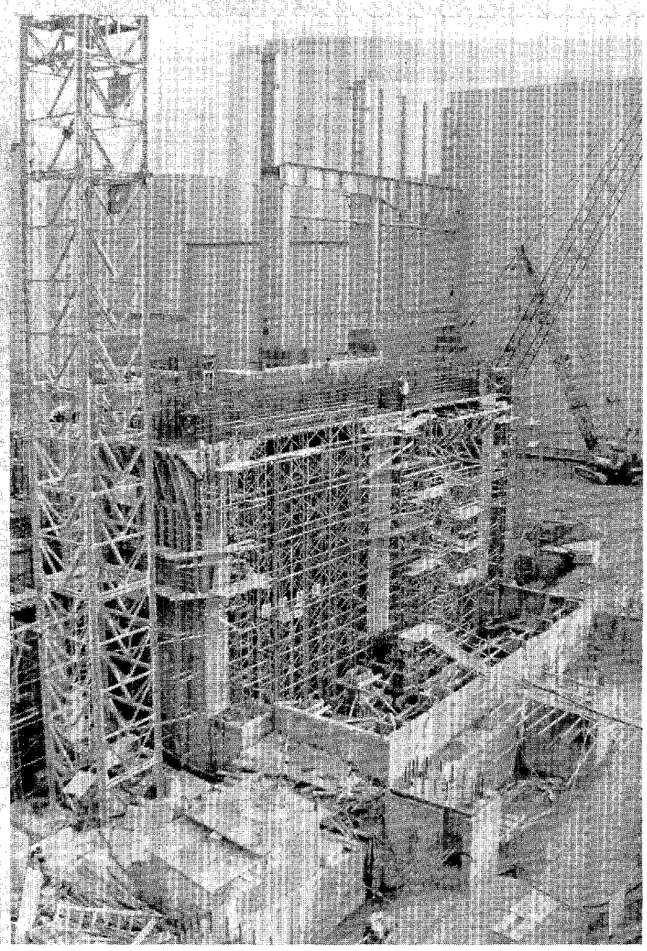


Ko-Ri Unit 2

FOR OVER TEN YEARS the Atkins Group has had a major involvement in the Korea Electric Power Corporation's Nuclear Power Station at Ko-Ri on the south east coast of Korea, some 30km north of Pusan. For the first unit, commissioned in 1978, Atkins provided the majority of civil, structural and building services and the Group has also provided a similar range of services for the second unit. This work is now nearing its end, with final commissioning of Unit 2 taking place within the next few months.

Ko-Ri Unit 2 consists of a second pressurised water reactor, supplied by Westinghouse Electric Company, and a single GEC 650MW steam turbine generator set. Atkins was appointed by GEC Turbine Generators Limited to provide consultancy services in respect of the turbine hall and integral heater bay, switchyards and external ancillaries such as auxiliary boilerhouse, fire pumphouse, storage tanks and miscellaneous structures.

Top: The Unit 2 turbine hall is on the extreme left of the group of buildings; its reactor is in the centre background.



Right: Construction work in progress on the turbine hall of Unit 2.

Design

Atkins' work for the project was centred in Epsom with the Civil Engineering Division who undertook the project management role, and carried out all the detailed civil engineering design. One of the more complicated design aspects was with respect to the turbine pedestal, for which machine torque, out-of-balance, vacuum, friction and short circuit loading conditions all had to be taken into account, and stresses caused by seismic disturbances and concrete shrinkage also allowed for. The design criteria for this was to provide structural adequacy under all loading conditions ensuring that the natural frequency of the pedestal is well outside critical, and that relative deflection of adjacent shaft bearings is limited to 1.25mm during normal operating and earthquake conditions. Atkins Research and Development carried out a dynamic analysis of the structure using ASAS – the general-purpose structural analysis system developed by Atkins.

Due to the unavailability of large rolled steel sections from the Korean steel producers, steelwork design by Atkins' Structural Engineering Division was based on extensive use of fabricated three-plate sections. The main building columns supporting the roof and a 230-tonne overhead crane were of a fabricated box construction, measuring 2590mm by 1070mm.

Building services design for lighting and small power was undertaken by the Environmental Engineering Division at Epsom, and for the HVAC system by the Bristol office. The HVAC layout incorporates a recirculation system for energy conservation purposes, whereby, during periods of low ambient temperature, heat generated within the building is extracted from high levels and distributed into the lower ground floor regions.

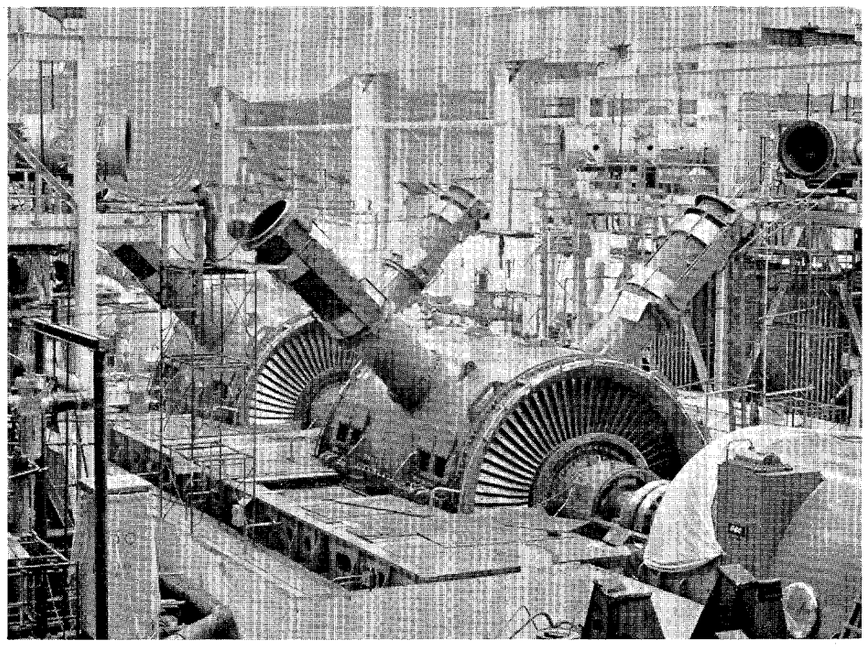
Procurement

Since the Korean site contractor essentially provided labour only, Atkins procured on behalf of GEC the majority of the permanent materials required for the work. Materials and equipment were purchased from three localities, namely UK, Japan, and Korea. UK supply items included a range of electrical and HVAC items, and civil materials which were either required early in the construction phase (*eg* main holding-down bolts) or

which were of a specialised nature.

As with any developing country, the client was anxious to localise as much of the supply as possible. Due to the potential alkali-reactivity of the aggregate (the coarse aggregate was quarried, crushed and graded on site), cement was required to be of a low alkali type. Despite exhaustive searching, only one source was found in Korea, and that was manufactured intermittently. This resulted in variable quality, requiring additional testing on site, and the implementation of a tight stock control system.

Since the characteristics of the reinforcement bars were required to be compatible with UK design codes, a wide range of sources was considered and investigated. Finally, to meet programme and quality restraints, orders were placed with Japanese suppliers, and inspections were made by site staff travelling from Ko-Ri. The majority of goods, however, were provided from within Korea, and included a major order for the supply and fabrication of over 4000 tonnes of structural steel.



The 650-megawatt steam turbine set, supplied by GEC Turbine Generators Limited for Ko-Ri Unit 2, under construction. Commissioning is due to take place in the near future.

Supervision in Korea

The site establishment was founded early in 1978, some months before the start of construction activities. This somewhat longer than usual lead-in time was necessary in order that procurement activities could commence, that the programme could be agreed with the site contractor, quality assurance/quality control procedures prepared, and construction techniques, *etc* agreed.

A control network covering all Atkins' engineering and procurement activities was established and introduced into the overall GEC project programme. On site, an overall construction programme was developed by Atkins, and this served as the master programme against which site progress was monitored.

For control purposes on site, monthly and weekly schedules were developed. The monthly programme not only showed the details of activities for the coming month, but included an outline of the following month's work, and an actual record of progress made during the previous month. Both the monthly and weekly schedules were drawn up in considerable detail with, for instance, every concrete pour referenced.

This discipline of planning and referencing all the pours for each structure well in advance of construction provided an excellent system for programming, QA documentation, and liaison of late change control between site and Epsom.

With design and construction being on a 'fast track' basis, it was important that the design office were aware of the exact state of construction on site. The difficulties of keeping this office so closely informed of progress from a site about 13 000km from Epsom were far outweighed by the benefits of dealing with late change requests. Decisions on the feasibility of alternative methods of assisting the client in incorporating changes were able to be made quickly and positively.

Steelwork fabrication

Daily early-morning meetings with the contractor provided a forum for reviewing the previous day's work and agreeing the day's activities, taking account of actual labour and plant resources on site on the particular day. These meetings demonstrated further the co-operation between Atkins and the site contractor. It was through the vigilant attitude of all concerned on site that, having placed the first concrete in October 1978, the building was weathertight and ready for turbine erection to commence within seventeen months.

At the same time as the first placement of concrete on site, steelwork fabrication started at the shipyard of Hyundai Heavy Industries (HHI) at Ulsan. It is interesting to note that HHI at this time was diversifying its activities owing to the downturn in shipbuilding for which the plant was originally designed. Our resident staff in the works were therefore faced not only with the usual difficulties of operating in a foreign country, but with having to assist in the supervision and instruction of the workforce in fabrication of structural steelwork to UK standards. The resident staff were responsible for checking the fabrication drawings, supervising the fabrication and witnessing the non-destructive testing. As at site a number of stage inspections were made for each element in order to keep a tight control of quality.

Although most of the smaller components were transported by road, the fabricator used the coastal location of both his factory and the site for barges to supply the larger items.

Quality assurance

Atkins was responsible for the quality management of all GEC's civil and structural activities and accordingly compiled the quality plan and quality procedures. Those of the site contractors were also written by Atkins. For reasons of overall efficiency, urgency and cost-effectiveness, the quality plan provided that the Atkins organisation of construction supervision duplicated that of the site contractor from the level of inspector to site manager.

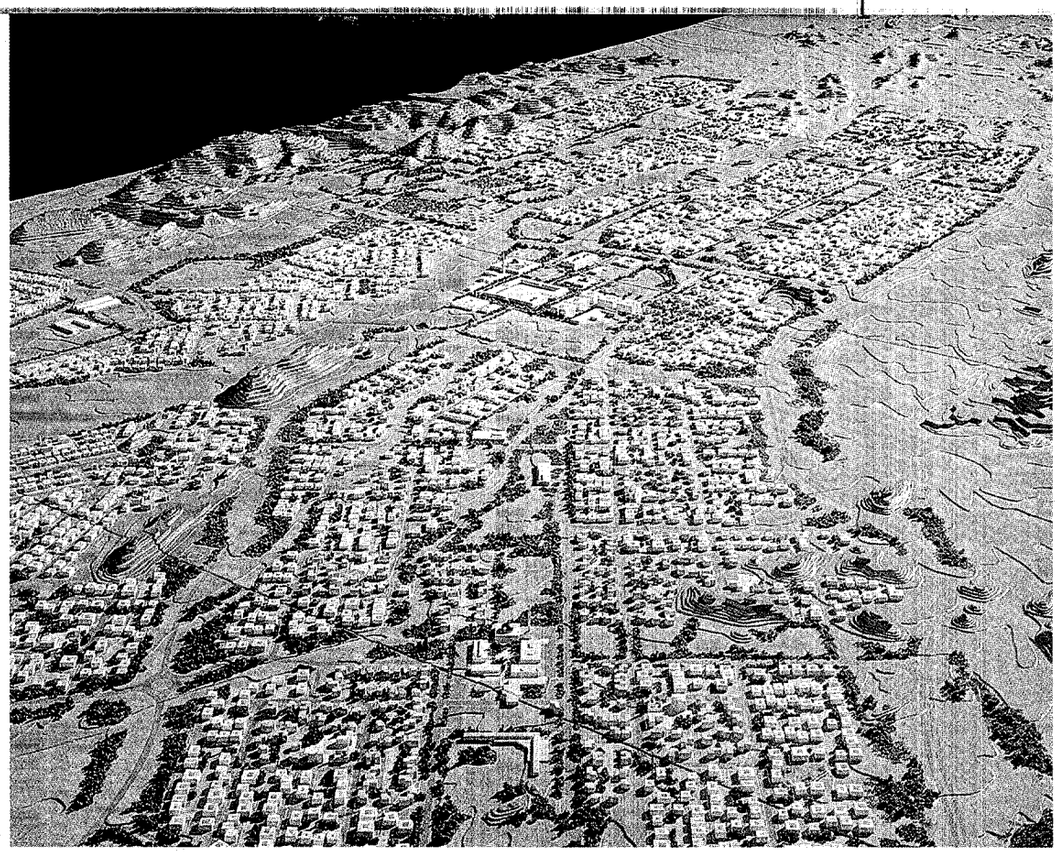
As part of these wide responsibilities for quality assurance, Atkins also carried out quality verification of construction activities, and surveillance and quality system audits of the site contractor. Other activities ranged from tender appraisal through to quality verification for all materials brought on to the site or related to the permanent works. Quality audits were conducted on the site contractor on a regular basis, as were audits carried out by the client and main contractor on Atkins' activities. The quality plan also provided for internal quality audits to be carried out within Atkins for both head office and site activities.

Separate quality programme plans were established for off-site fabrication, and depending on the size, quality management functions were carried out by either visiting or resident staff.

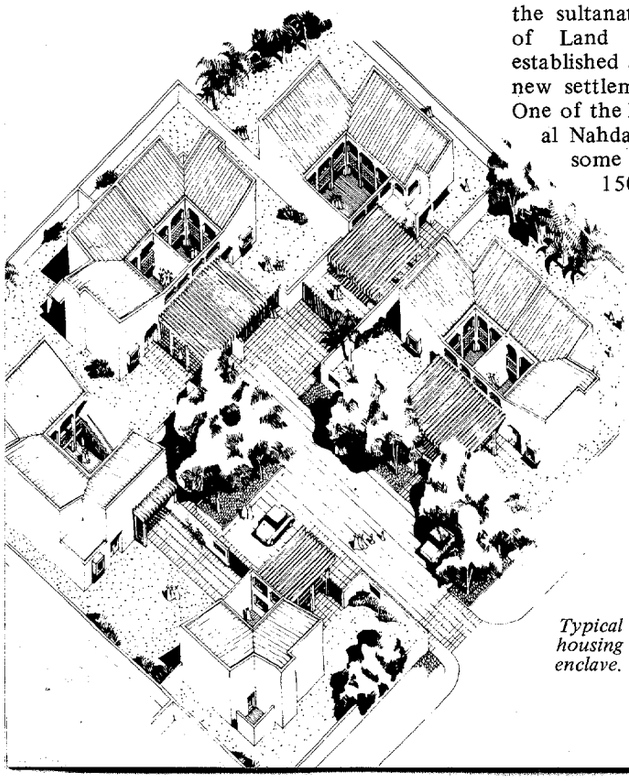
Atkins' project director was Les Davies, with Bob Courtier as project manager, both of the Civil Engineering Division of WS Atkins & Partners. Other Atkins Group companies involved in this project include Atkins Research and Development (dynamics); Atkins Inspection Services Limited (non-destructive testing); and Atkins Sheppard Fidler and Associates (architecture). The main site contractor was Dong Ah Industrial Company Limited, and steelwork fabrication was by Hyundai Heavy Industries.

Madina al Nahda

A NEW TOWN TO HELP OVERCOME MUSCAT'S HOUSING SHORTAGE



The WS Atkins Group has recently completed detailed town planning, engineering design work, and preparation of construction contract documents for all infrastructure services associated with the development of the new town of Madina al Nahda, Sultanate of Oman. The successful execution of the design in 14 months called upon the full multi-discipline capabilities of the Group in town planning, architecture, landscape architecture, transport planning, highway engineering, civil and structural engineering, and cost estimating.



Typical housing enclave.

THE CAPITAL AREA of Muscat, Oman, experienced a dramatic transformation during the 1970s as a result of policies of the new government of His Majesty Sultan Qaboos Bin Said directing the benefits of oil-related economic growth into social development and infrastructure projects. A serious housing shortage has arisen as the capital area population has multiplied due to migration from rural areas and the influx of expatriate workers. Residents of older parts of Muscat need to be moved from sub-standard housing while others have been displaced by development projects.

To overcome the housing shortage, the sultanate has, through the Ministry of Land Affairs and Municipalities, established a bold programme to develop new settlements within the capital area. One of the largest of these will be Madina al Nahda. With a target population of some 50 000 and covering an area of 1500 hectares, it will make an important contribution to overcoming the capital area housing shortage.

The new town site

Situated in a massive basin surrounded by limestone mountains, some 15 kilometres from the heart of Muscat, the new town presented a significant design challenge to maximise the potential of a dramatic natural setting where there are particular climatic and physical constraints. The area is a sparsely vegetated *wadi* gravel plain where extremely high temperatures have been recorded in the summer months. The site is characterised by *wadi* channels and frequent steep-sided schist outcrops of up to 50m in height. There is a very real risk of flooding as a result of infrequent but high intensity flash storms.

Parts of the area are currently cultivated and settled, crop irrigation being by an ancient and protected channel system known as the *falaj*. It is necessary to integrate into the new town both settlers of Bedou origin and residents of a partially developed area of private housing.

Design objectives

The objective is to create a self-contained town with its own industrial and commercial areas. When fully developed, there will be some 1000 units of government housing and 6500 plots for private development. An industrial area of 250 hectares has been planned, with provision for further expansion should demand exist. There will be a presumption against all pollutant industrial activities because of micro-climatic factors, and the risk of polluting ground water which recharges one of the main aquifers supplying the capital area.

In planning new settlements it is important to determine the socio-economic characteristics of future residents. Such data is scarce in Oman, and only limited social studies could be undertaken within the commission. Moreover, the social and cultural characteristics are currently changing very rapidly in Oman. Flexibility has been a keynote of the design process. To take account of the inevitable uncertainties surrounding future estimates of family size, dwelling occupancy and car ownership and usage, a population range of 44 000 to 57 000

has been investigated for the purpose of infrastructure design. The upper figure has governed when estimating demand for services, while the lower figure has been adopted to check minimum required flows in sewers, and the availability of treated sewage effluent for landscape irrigation.

The development plan

The development plan takes full account of the prevailing physical constraints of the site. Significant schist outcrops are to be retained as landscape features, providing landmarks and points of reference. Care has been taken to ensure that the town interferes as little as possible with the established natural drainage patterns of the area. Main *wadi* channels will be stabilised to provide the 'strategic' storm drainage system.

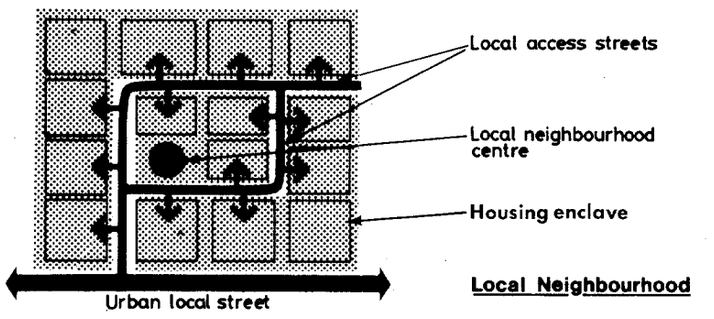
The plan form ensures that the town will have a clear hierarchical structure both in its transport network and provision of facilities. At the most local level, in residential areas, seven to 16 housing plots are grouped around courtyards to create semi-private enclaves, protected from through traffic and providing parking space for visitors and safe play areas for children. Enclaves are grouped into neighbourhoods of such size (approximately 1000 people) that their populations can support the provision of essential local facilities (such as a mosque and local shops) while ensuring that all residents are within easy walking distance of these services. The new town will have 31 neighbourhoods outside the existing developing area.

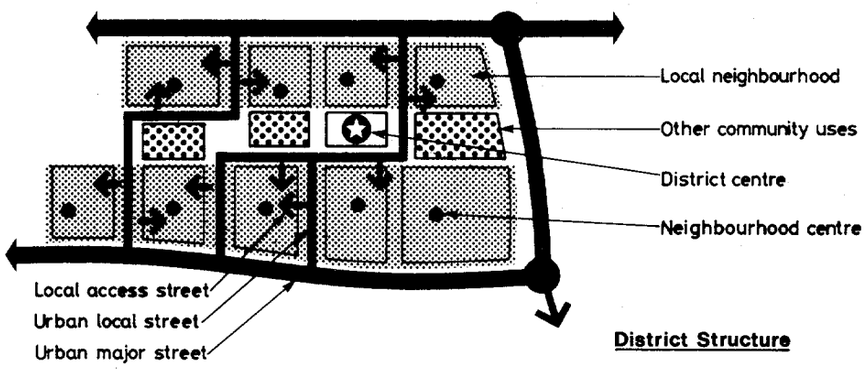
Clusters of local neighbourhoods are served by district centres, of which there are four, providing more extensive social, community and commercial services. The highest order of facilities, including administrative and emergency services, are within the town centre. Public and private transport movement is provided by a hierarchical road system carefully designed to exclude extraneous traffic from residential areas. The plan includes development proposals for educational and community facilities, recreation and open space and a landscape structure which provides a development framework for the town.

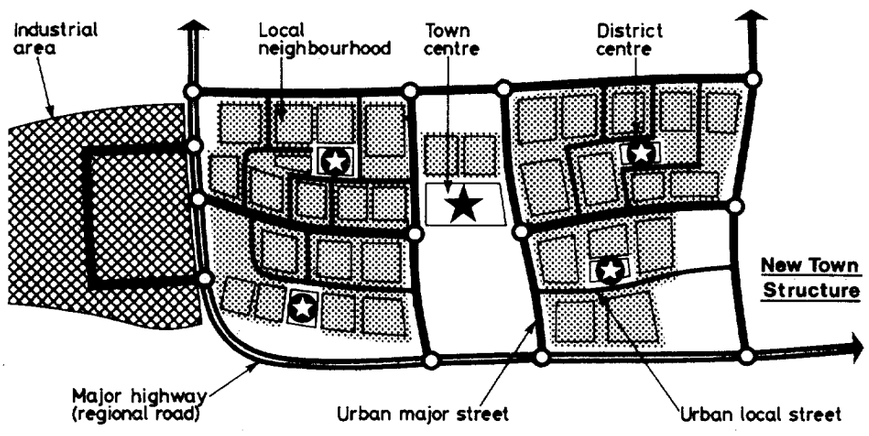
All land has been subdivided into plots for which specific uses have been designated. Setting-out information and plot referencing has been scheduled for every plot of land in the new town. This will facilitate both the disposal of land and control of development.

Concept designs have been prepared for government housing to provide a range of house types matched to the expected mix of family sizes. Although the detailed planning and design of neighbourhood, district and town centres is excluded from the commission, sketch layouts have been prepared to test the feasibility of land allocation and accessibility.

Landscape proposals have three main elements: structure planting to provide a framework for the urban development; local planting to provide green areas in housing enclaves, urban streets and facility centres; and hard landscaping to include all paved areas and features such as pergolas, parking shade structures, walls, bus shelters, public seats, litter bins and drinking fountains. Irrigation of the structure planting will be by a system of pumped treated sewage effluent, while irrigation in housing and other public areas will be by potable water.







Infrastructure design

Detailed highway design has included the preparation of contract documents for some 33km of primary and secondary roads and 60km of local and residential streets. In addition, nine multi-cell box culvert *wadi* crossings, six Irish crossings, and three multi-span bridges each about 100m long have been designed in detail.

Civil works included detailed design of the water supply distribution system, surface water drainage, treated sewage effluent landscape irrigation system, and flood protection works for some 14km of *wadi* channels. In addition, outline designs have been prepared for two water storage towers with capacities of 4 100m^3 and 2 400m^3, the sewage treatment works with a capacity of 12 000m^3 per day, and the refuse collection system for the town. Full designs have been prepared for street lighting, and below-ground high-voltage power supplies to feeder pillars in residential neighbourhoods.

The project has been executed by integrated teams of planners, landscape architects and engineers to ensure efficient co-ordination throughout the design period, while expert level design guidance and appraisal was provided by the planning adviser for the Ministry of Land and Municipalities, Mr Khalid Aziz.

Michael Dyer is the Group board director responsible for the project and Ken Farnes is the project director. The project has been managed by Roger McGlynn of Atkins Sheppard Fidler and Associates with Oman office support.

SOUTH TEES ROAD STUDY

CLEVELAND COUNTY Council has appointed WS Atkins & Partners' Middlesbrough office to undertake a feasibility study on the building of a 3.1km road to run from the Middlesbrough Dock area to Smith's Dock in South Bank. Land will then be opened for development between the road and the River Tees.

The road will be close to the Darlington/Saltburn railway line and will involve two new bridges – one on South Bank Station, which will be two-span and cross the station and four railway tracks, and the other a single span to cross Normandy Beck.

The scheme will form part of the South Tees area development and will involve capital investment of some £4.3 million. Keith Hounslow is project manager, with Ken Peacock as project engineer.

WSAGC board appointment

Michael Muller

MICHAEL MULLER has been appointed to the board of WS Atkins Group Consultants. He has been on secondment to International Military Services Limited (IMS) since 1980 as director of operations and is remaining a non-executive director of IMS upon completion of his secondment.

New contents control system

INTRODUCED BY Kins Applied Technology Limited, the new K1000E prepack contents control system will help packaging managers cut back on costly overfill whilst still meeting the requirements of the Weights & Measures Act (1979).

Following great success with the K1000 and K2000 computer-based weight control systems, Kins is offering the K1000E with substantial price and operational advantages. By using the latest technology the cost of the new system has been cut by more than 30 per cent, whilst at the same time providing greater operating flexibility and reliability plus extended reporting facilities.

To back its performance claims, Kins now offers a free feasibility assessment of each customer's requirements together with a no-risk performance guarantee. By analysing packaging data collected by the potential customer, Kins can assess the savings a K1000E system would make. Mutually agreed performance criteria for a system are then laid down, and Kins undertakes to repurchase the K1000E from the user should it not perform as expected.

SECONDMENT TO MANPOWER SERVICES

THE FORMER head of Human Resources Development in Atkins Planning, John Woolhouse, is on full time secondment to the Manpower Services Commission for two years, leading the team running the government's new technical and vocational education venture. The team is setting up and monitoring the scheme to help local authorities start pilot projects giving 14-18 year olds more technical and vocational training, to meet the current need for more highly-trained and skilled people in industry, commerce and the public service. Robin Hall has now become head of the department.

New literature

THE FOLLOWING publications have been produced recently by Public Relations and are available from the Sales Co-ordination Office.

Brochure
ATMOS computer-aided surveying services (WS Atkins Group).

Experience sheets
Unit 2, Ko-Ri nuclear power station, Republic of Korea (ES 0088).
M25 London Orbital Motorway, Egham to Chertsey, Reigate Hill to Westerham (ES 0090).

Reprints
Project management information system for the nuclear industry *(Insight 57)*.
Quality assurance at Mossmorran *(Insight 57)*.
The sports complex at Tlemcen University *(Insight 57)*.

MCA's 1983 chairman

Robin Moore

ROBIN MOORE, has been elected chairman of the Management Consultants Association for 1983. He is managing director of Atkins Planning and a director of WS Atkins Group Consultants. He joined Atkins in 1972 to set up the operational consultancy department which provides a complete range of management consultancy services to clients.

ALAN PARISH ELECTED FEng

Alan Parish

ALAN PARISH, deputy chairman and chief executive of WS Atkins Group Consultants, has been elected to the Fellowship of Engineering. Established in 1976 by the Council of Engineering Institutions, the Fellowship performs a similar role in engineering to that of the Royal Society in science; the Senior Fellow is HRH the Duke of Edinburgh.

The election took place at the annual general meeting at St James's Palace on 28 March.

Mr Parish, who joined WS Atkins & Partners from English Electric in 1958, was appointed an associate in 1963 and became a director in 1967. Eight years later, upon the formation of WS Atkins Group Consultants, he became a deputy chairman and subsequently its chief executive.

Two other members of the WSAGC board are members of the Fellowship of Engineering – Sir William Atkins and Mr James Grout.

News in brief...

THE NEED for a long-term improvement programme for the A494/A550 trunk highway corridor between Ewloe in Clwyd and Woodbank in Cheshire is being investigated for the Welsh Office by Atkins' Swansea office.

DAVID SLATER, of the Project Management Services Division, has been appointed as resident manager of the Atkins office in Muscat, Sultanate of Oman.

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THE ADDRESS of the Group's Cardiff office has changed. It is now at Longcross Court, Newport Road, Cardiff CF2 1AD – telephone Cardiff 485159.

Papers

The following papers have been or will be presented by Atkins Group personnel.

Project planning, structuring and implementation by Dick Bourton (Atkins Planning) – Institute of Petroleum conference on the appraisal of fossil fuel capital projects, London, 16 November 1982.

Defects in metal cladding systems by David Howell (Structural Engineering Division), Royal Institution of Chartered Surveyors continuing professional development programme, London, 17 January 1983.

The validation of marine riser computer programs by Don McIver (Atkins Research and Development).

Practical problems with computer simulations of single point mooring systems by Rod Rainey and Cam MacFarlane (Atkins Research and Development) – Second international mechanics and arctic engineering symposium, sponsored by the American Society of Mechanical Engineers, Houston, Texas, 31 January – 3 February 1983.

Non-linear effects of midship flare on motion response of drillships by Bill Stewart and Sangem Hsu (WS Atkins Inc) – The Society of Naval Architects and Marine Engineers, Houston, Texas, 4 February 1983.

A consulting engineer's viewpoint by John Faulkner (WS Atkins Group Consultants) – Mogul International Consultant Ltd management contracting conference, London, 16 March 1983.

The road ahead to the implementation of a highway performance database by Chris Hawcroft (Atkins Planning) – Institution of Highway Engineers 'feedback' conference, Leamington Spa, 12 April 1983.

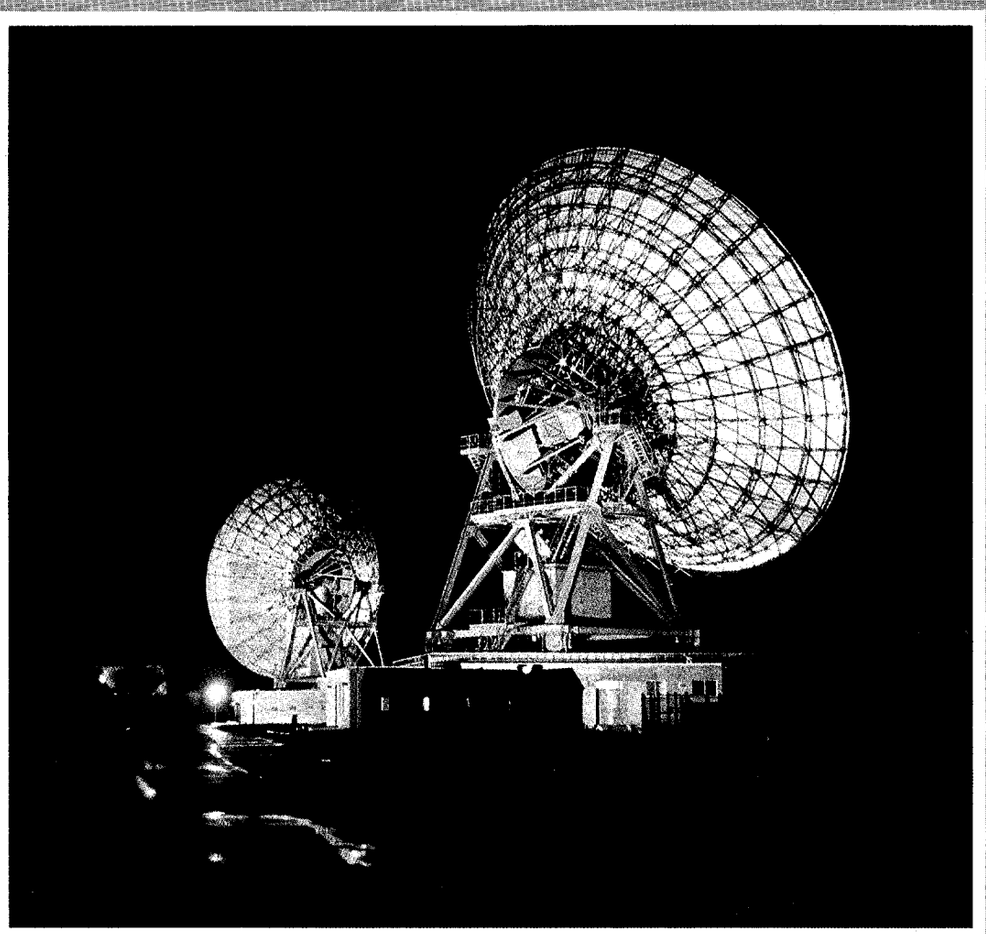
A consultant's view of the client's role by John Faulkner (WS Atkins Group Consultants) – Chartered Institute of Building and the Institute of Advanced Architectural Studies conference on professional management in construction – project management and management contracting, London, 19 April 1983.

The completely safe and reliable plant: Is this possible? by Gopal Srinivasan (Engineering & Industrial Processes Division) – London and Kent Centre of the Institution of Chemical Engineers, at the Society of Chemical Industry, London, 20 April 1983.

Burning colliery waste and dust pollution – the reclamation challenge at Gorseinon by John Campbell (Metallurgical & Mineral Processes Division) – Industrial Seminars Limited "Reclamation '83" International land reclamation conference and exhibition, Civic Hall, Grays, Essex, 26-29 April 1983.

The use of a computational method to assess the safety and quality of ventilation in industrial buildings by Tim Broyd, Bruce Dean, Alan Moult and Steve Oldfield (all Atkins Research and Development) – Institution of Mechanical Engineers' international conference on heat and fluid flow in nuclear and process plant safety, London, 17-18 May 1983.

Wind studies for earth-satellite station



British Telecom International operates three 32m diameter dish-shaped aerials at its satellite communications earth station at Madley, near Hereford, which provide international telecommunications to more than 50 countries via satellites positioned over the Atlantic and Indian Oceans.

These aerials radiate very narrow beams of radio energy and must remain pointing precisely at their respective satellites – even in high winds – to preserve a top quality service. However, extremely high winds might damage the aerials if they were left in the operating position. It could therefore become necessary to stow them in a minimum wind-load configuration.

Phone calls normally carried by any aerials which are stowed would have to be re-routed – where this is possible – via cables or other earth stations. Because re-routing is complex and expensive, aerials are stowed only when absolutely necessary. The provision of accurate short-term predictions of wind behaviour would be useful to determine whether stowing is needed.

British Telecom commissioned Atkins Research and Development to analyse six months of wind data obtained at the site, and to assess the feasibility of providing suitably accurate short-term predictions. Investigations completed so far have revealed peculiarities in the wind behaviour due to the proximity of the Black Mountains and other hills.

Further work for British Telecom will include the installation at Madley of hardware and software to provide the wind-prediction capability. (Photograph by George Mitchell)